Extension of Bayesian procedures to integrate and to blend multiple external information into genetic evaluations

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Current genetic evaluations are mostly based on local data, potentially followed by an international second step, as it is performed by INTERBULL (Uppsala, Sweden) for dairy breeds. However, reliability of estimated breeding values (EBV) for animals with few local data may be limited. Furthermore, the current development of genomic selection makes this issue more important and the blending of those multiple sources more necessary. Current methods are based on selection index and Bayesian procedures were proposed for a single external source. The aim of this research was to extend these methods to integrate information from multiple sources outside a given evaluation system, i.e. external information, into this genetic evaluation, i.e. internal evaluation, and to assess its potential to blend multiple sources of information when only external information is available. To allow simplifications of the computational burden and the propagation of all external information through the whole pedigree, all animals were considered as animals associated to external information thanks to the prediction of external information from available one for internal animals, i.e. animals with no external information. Multiple considerations of contributions due to relationships among animals were also taken into account. Two dairy cattle populations were simulated across 5 generations. Internal females were randomly mated with internal and 50 external males. Milk production for the first lactation for each female was simulated in both populations. Results for 100 replicates showed that average rank correlations among Bayesian EBV and EBV based on the joint use of external and internal data were close to 1 for both external and internal animals. The respective correlations for the internal evaluation were equal to 0.54 and 0.95. Mean squared error, expressed as a percentage of the internal mean squared error, was close to 0% for both external and internal animals. Thereby, the Bayesian

procedure has the potential to integrate and to blend multiple sources of external information to evaluate animals more reliably.

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